We claim:-

1. A process for the continuous preparation of the tert-butyl ester of an aliphatic C_1-C_4-carboxylic acid by reacting the carboxylic acid with isobutene in the liquid phase in the presence of an acidic catalyst, wherein the reaction is carried out in a reactor divided into a plurality of sections, the carboxylic acid, the isoolefin and the catalyst are fed into the first section of the reactor, the reaction mixture obtained is removed from the last section of the reactor and the ester is isolated therefrom, the reaction temperature in the reactor being controlled so that it is from 10 to 40°C and is highest in the first section of the reactor.

2. A process as claimed in claim 1, wherein a reactor having from 3 to 5 sections is used.

3. A process as claimed in claim 1 or 2, wherein the reaction temperature in the first section is from 30 to 40°C.

4. A process as claimed in any of the preceding claims, wherein the reaction temperature in the second section is from 5 to 15°C lower than that in the first section.

5. A process as claimed in claim 4, wherein the reaction temperature in the third section is from 3 to 10°C lower than that in the second section.

6. A process as claimed in any of the preceding claims, wherein the reaction temperature in the first section of the reactor is from 30 to 40°C and that in the last section of the reactor is from 10 to 25°C.

7. A process as claimed in any of the preceding claims, wherein a part of the reaction mixture contained in the first section is discharged and is recycled together with carboxylic acid to the first section.

8. A process as claimed in any of the preceding claims, wherein the isobutene fed into the first section comprises fresh and recycled isobutene, the fresh isobutene being fed in in liquid form and the recycled isobutene being fed in in liquid form and/or gaseous form.

9. A process as claimed in claim 8, wherein the recycled isobutene is fed in as a mixture with the carboxylic acid.

10. A process as claimed in any of the preceding claims, wherein the carboxylic acid used is (meth)acrylic acid or acetic acid.

11. A reactor which is divided into a plurality of sections (R1, R2, R3, R4), which are separated from one another by dividing walls (2, 2', 2'') each having at least one orifice (3, 3', 3''), and which has a nozzle (9) extending into the first section (R1), means for feeding in and removing the substances involved and means for controlling the temperature in the sections (R1, R2, R3, R4).

12. A reactor as claimed in claim 11, wherein the dividing walls (2, 2', 2'') each have an orifice (3, 3', 3'') which is present substantially in the center of the dividing wall.

13. A reactor as claimed in claim 11 or 12, wherein the nozzle 9 used is a jet nozzle, mixing nozzle or binary nozzle.

14. A reactor as claimed in any of claims 11 to 13, wherein an annular tube (6) having a plurality of outlet orifices and a line (5) for feeding in a starting material is provided in the region of the bottom in the first section (R1).

15. A reactor as claimed in any of claims 11 to 14, wherein the volume of the first section (R1) is greater than that of the remaining sections and accounts for from 25 to 50% of the total reactor volume.

16. A reactor as claimed in any of claims 11 to 15, wherein the first and/or second section (R1, R2) is equipped with static mixing elements.

17. A reactor as claimed in any of claims 11 to 16, wherein a nozzle for mixing the content of the second section (R2) is provided and is arranged in such a way that its outlet orifice is present in the orifice (3), roughly in the plane of the dividing wall (2).